Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

CRETACEOUS-EOCENE CONTACT

TOMBIGBEE RIVER, ALABAMA

EUGENE ALLEN SMITH
University, Ala.

The Selma chalk, which is so beautifully exposed at Demopolis on the Tombigbee River, grades upward into a more argillaceous material a few miles below the town. A fine exposure of this variety is at Barton's Bluff on the left bank of the river, about ten miles below Demopolis. For a distance of a mile or two above Barton's and at the bluff itself, there are scores of faults of a few feet displacement. Some of these are of the nature of step faults, others, especially as the bluff is neared, bring the white chalk of the Demopolis variety in wedge-shaped blocks up into the dark-colored clayey material characteristic of the bluff as a whole. In places the strata show a very considerable amount of flexure in addition to the faulting. Fig. 1 is given in illustration.

Below Barton's for some distance the banks of the river show very few good sections until Moscow Landing is reached. Here the bent, fractured, and faulted beds of the Cretaceous are overlain unconformably by the lowermost (Midway) beds of the Eocene of this section.

The main mass of the Cretaceous, forming the base of the section exposed at Moscow, is a light-colored argillaceous limestone not unlike the Selma chalk of the Demopolis type. The dark-colored clayey beds of Barton's Bluff are not shown here. This limestone is a somewhat massive rock with stratification lines very obscure, but near the top of the formation there is a thin layer of phosphatized shell casts which may easily be followed along the bluff and by which the attitude of the strata may clearly be made out. The Eocene beds which form the upper fifteen or twenty feet of this section are of material very similar to the Cretaceous limestone below. Along a good part of the bluff this Eocene limestone lies in immediate contact with the Cretaceous, and when this is the case the unconformity is very little apparent, since the phosphatized shell-cast layer of the Cretaceous, above alluded to, runs practically parallel to the stratification lines of the Midway with a gently undulating dip down stream. Near the base of the Eocene there is a thin layer of shells of a small oyster (*O. pulaskensis*, Harris) which very clearly indicates the attitude of the Eocene strata, as the layer of phosphatized shell casts does that of the Cretaceous. At the extreme right and left of Fig. 2, this approximate conformity is shown. The dark line immediately above the contact is made by the layer of oyster shells.

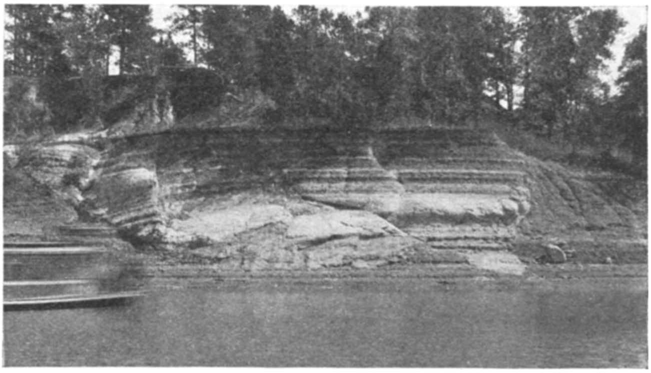

FIG. 1.—Flexures and faults in Cretaceous strata at Barton's Bluff, Tombigbee River, ten miles below Demopolis, Ala.

At intervals, however, especially in the up-stream part of the bluff, there are hollows in the Cretaceous limestone, formed partly by erosion and partly by flexure, in which are plano-convex lens-shaped masses, twenty to forty feet in length, made up (*a*) of a sort of conglomerate of Cretaceous shells, mainly exogyras and gryphœas, in a chalky argillaceous limestone matrix, in all some three or four feet in thickness, and above this, (*b*) a glauconitic sandstone, strongly crossbedded and filled with Cretaceous shells, some of them very much water-worn. These two fillings may clearly be seen in the lens at the left of Fig. 2. In the lens at the right of the figure the sandstone is very prominent, but the underlying shell conglomerate does not show so well. A remarkable thing about these sandstone lenses is the manner in which the strata are flexed and their edges

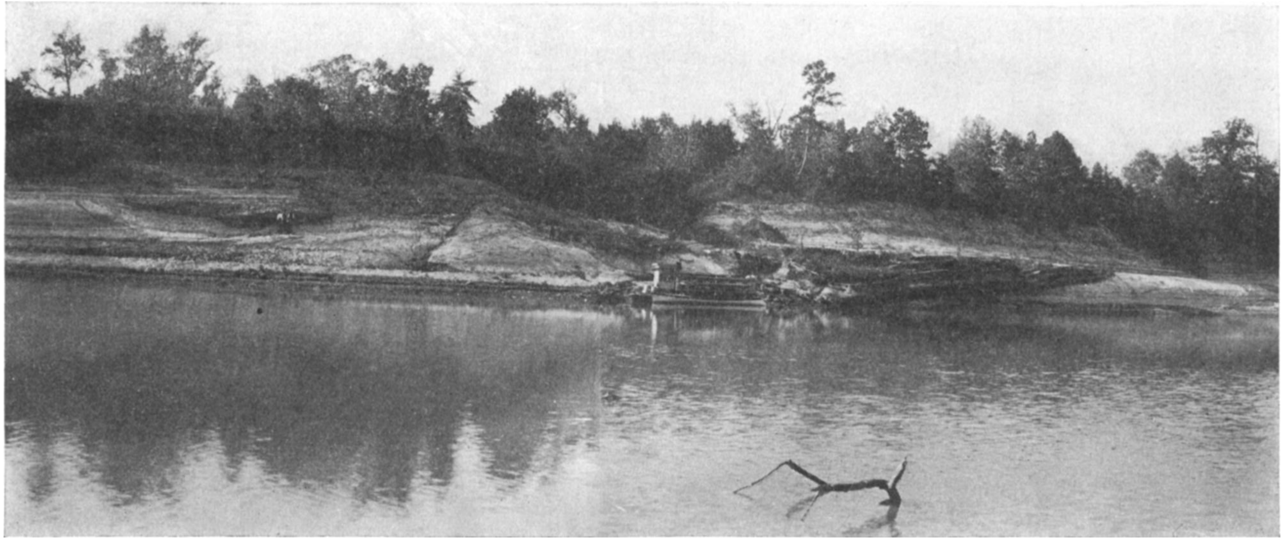

FIG. 2.—Moscow Landing, Tombigbee River, Ala. Contact of Cretaceous and Eocene, the latter resting directly on the beveled edges of the sandstone lenses, and where these are not present, upon the Cretaceous limestone, often in apparent conformity. Immediately above the line of Cretaceous-Eocene contact another line may be traced the whole length of the bluff, made by a thin layer of the shells of *Ostrea Pulaskensis*. The central part of this section is much disturbed by faulting which involves both Cretaceous and Eocene. Three sandstone lenses are here seen occupying erosion or plication hollows in the Cretaceous limestone.

beveled off at the contact with the Eocene. This is particularly well shown in the lens at the right of Fig. 2.

Overlying the Eocene limestone, lower down the river than either of the views shown in the figures, are black shaly clays, the Sucarnochee clays of the Alabama Survey, exposed in great thickness at Black Bluff a few miles below Moscow Landing.

Near the upper end of the Moscow Bluff both Cretaceous and Eocene beds are faulted, the displacement being generally only a few feet, as may be seen in Fig. 3, the beds immediately above the beveled-off sandstone lenses being Eocene. Along many of these fault planes sheets of calcite, one or two inches in thickness, have developed, with one surface after the manner of a slickenside.

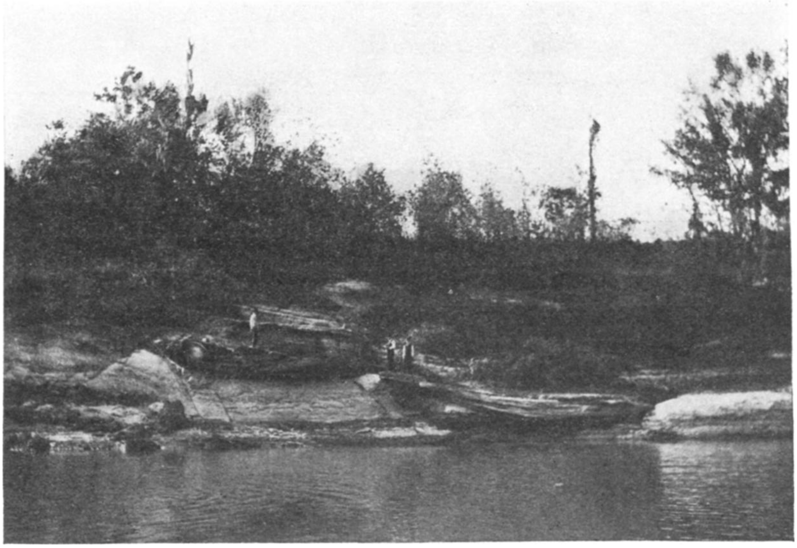

FIG. 3.—Bluff near Moscow Landing, Tombigbee River, Ala., showing two of the sandstone lenses in erosion hollows in Cretaceous limestone. Both Cretaceous and Eocene strata are faulted. The strata which directly overlie the beveled edges of the sandstone lenses are Eocene.

When this bluff was first visited by D. W. Langdon and the writer in 1886, the small oyster was thought to be *O. vomer*, and the whole section, with the exception of the black clays at the lower end of the bluff, was referred to the Cretaceous; but on a visit to the locality made in 1908 by a party of state geologists and others on a trip down the river from Tuscaloosa to Jackson in Clarke County, several specimens of *Enclimatoceras Ulrichi* were found in the upper limestone bed, and the small oyster was recognized as *O. Pulaskensis*, thus establishing the horizon as that of the Midway.

It has been suggested that the glauconitic sandstone is a basal Eocene bed, but its local character and the unconformity between it and the Midway everywhere would militate against this view. The unconformity, in places, between it and the Cretaceous below, is, however, equally pronounced.

There are many things about these sandstone lenses which are not easily understood. Thus, to all appearance these beds after their deposition have been tilted and their edges beveled by erosion, and this in one or two cases without any perceptible disturbance of the Cretaceous limestone upon which they rest. This is shown by the fact that the bed of phosphatic shell casts, which presumably marks a stratification plane in this limestone, in approximately horizontal position, in some cases, maintains this attitude to the very edge of the erosion hollow containing the shell conglomerate and sandstone; while in other cases this phosphatic shell bed bends down below these hollows, as though they were produced by plication and as though the stratification of the Cretaceous limestone were conformable to that of the shell conglomerate and sandstone.